VII. An EJay towards an Hiffory of the Britilh Stellated Lycoperdons: being an Account of fuch Species as bave been found in the Neighbourhood of Bungay, in Suffolk. By Thomas Fenkinfon Woodward, Efq. F. L. S.

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## Introduction.

THE Stellated Lycoperdons are undoubtedly to be confidered as fome of the moft curious plants in the whole order of Fungi, both as to their external appearance, and their mode of vegetation. And as the author of this Effay has been in the habit of making obfervations upon them for feveral years, and has had an opportunity of thoroughly examining them in all the ftages of their growth; the ftellatum Linn. and its fuppofed varieties being very common, and the other fpecies by no means uncommon in this neighbourhood; he thinks an account of his obfervations may not be unacceptable to the Linnean Society: the more efpecially as he hopes to be able to throw fome new light upon the fubject of thefe curious, and, in general, fcarce plants; and to correct fome errors which have been made public relating to them.
I. It appears very extraordinary that thefe plants fhould have been totally overlooked by the older authors, no notice being taken of any of them in Bauhin's Pinax; though the common puff-ball (Lycoperdon bovifta Linn.) is there mentioned. Tournefort, Inft. R. H. $5^{6} 3$, mentions one fpecies, quoted from Boccone's Mufeum, and has figured it t .331 ; but this figure reprefents an old and decayed
decayed fpecimen, the head being irregularly torn and broken. Ray, Syn. ed. 2da, app. alfo defcribes one fpecies, found by Doody 1695 ; and in ed. $3^{\text {tia }}$, two fpecies. Of thefe, one is the common Lycoperdon ftellatum, of which Dillenius has there added a fig. t. I. f. I. and the other is referred to the plant of the 2 d edit. and to the fig. of Tournefort before mentioned; but this is defcribed by Ray, p. 28, coli inftar perforatus, which does not at all agree with the figure of Tournefort, and feems too remarkable a circumftance not to have been noticed in the Inft. fhort as the characters there given are. Micheli, Nov. pl. gen. p. 220, has enumerated, and has figured, t. 100, five fpecies, under the expreffive generic name Geafter. Three of thefe are referred, but doubtfully, to the authors before mentioned; and all of them feem reducible to Lycoperdon ftellatum Linn. or to the fuppofed varieties of that fpecies. Morifon, Hift. Oxon. tom. 3.p.641, mentions the ftellatum, but this is quoted from R. Syn. and not given on his own authority.
2. The firlt mention of the fpecies fince called by Mr. Hudfon Lycoperdon fornicatum, appears to have been under the fanciful name Anthropomorphus, by Sterbeck, Theatr. fung. and Seger, Eph. nat. cur. where a clufter is figured, with human faces drawn on the heads! Which of thefe authors was the original, and which the copier of this abfurdity, is hardly worth enquiring; but as Sterbeck's book was publifhed in 1675, and the Eph. nat. cur. began in 1690, it moft probably belongs to the former. Mor. Hif. Ox. tom. 3. p. 641, mentions the Anthropomorphus, and its authors, but it is only to exprefs his admiration at the abfurdity. Seg. Eph. nat. cur. ann. 4. two years after the firft, gives a tolerably good figure of Lyc. fornicatum, a folitary fpecimen. The firft notice of this plant by any Britifh author is in the Phil. Tranf. vol, xliii, $p .234$, where an extremely good figure and an account are given by the late Sir Wm. Watfon. After this an excellent reprefentation was given by

[^0]Blackfone, Spec. botan. $p$. 24. t. 2. The firft mention made by Linnæus of the Lycoperdon ftellatum appears to be in Hort. Cliff. ann. 1737, after which it is mentioned in Fl. Suec. and Sp. pl; ; but in the lateft editions of the works of this jlluftrious author no notice is taken of any other fimilar fpecies. It is from this probable, that, if any other had fallen under his obfervation, he confidered them as varieties of the ftellatum not worth noticing; it being well known that this order of plants obtained but a very fmall fhare of his attention. Haller Hijf. Stirp. Helv. tom. 3.2174 , quotes Lininæus's Lyc. Atell. and has referred to Watfon Phil. Tranf. and Blackfone Sp. bot. for (what he confiders as) a flight variety of it; but informs us that he had never feen this plant. He alfo refers to Eph. nat. cur. for Anthropomorphus; but he has quoted the faine work ann. 4. obf. go. for ftellatum, which he could not have done had he actually confulted it before he had made his reference.
3. Other more recent authors\% muft be paffed over to come to our ingenious countryman Hudfon, who deferves the warmeft thanks of all Englifh botanifts, for having firft completed an Englifh Flora, in which he has with admirable fagacity adapted the Synopfis of our immortal Ray to the Syftem of the illuftrious Linnæus; a work in which the errors are fo few, that, inftead of cavilling at them, it muft be matter of furprife, to all fuch as are competent to judge of the difficulty of the undertaking, that they are not much more numerous. This author, in his firf edit. 1764, has enumerated, along with the other fpecies of the genus Lycoperdon, two which are ftellated; viz. the ftellatum Linn. to

[^1]which he has quoted the fpecific character given in $\mathrm{Sp} . \mathrm{pl}$; and the plant mentioned in the Phil. Tranf, and by Blackfone, to which he has given the expreffive trivial name of fornicatum, and has adapted to it a fpecific character which clearly diftinguifhes it from the other fpecies. In this edition no other authors are referred to for this plant, but thofe juft mentioned; but in ed. 2 da , 1778 , the figures of Batarra and Schæffer are quoted, and an additional place of growth is mentioned from Mr. Tofield.
4. The two fpecies, Lycoperdon ftellatum and fornicatum, as characterifed by Linn. and Hudf. were confidered by all Britifh botanifts as clearly diftinguifhed and pointed out, till the publication of a pamphlet a few years fruce* by Mr. Charles Bryant, of Norwich, entitled,' An Hiftorical Account of two Lycoperdons:' This work has met with many admirers, even amonglt botanifts of eminence, but who have not had an opportunity of examining thefe plants in their native places of growth, where only, as the author juftly obferves,' 'an accur ate acquaintance with their mode of vegetation and different charaiters is to be obtained; and have confequently been mifled by the fpecious arguments and decifive ftyle of this publication. But though I object to the work, I am ready to do the author the juftice of declaring, that I know him to be an indefatigable and, in moft inftances, an accurate obferver and inveftigator of botanical fubjects; and am confident, that he had no other view in this treatife, than that of communicating to the world fuch obfervations as he himfelf was convinced were juft, and confequently ufeful in afcertaining fome doubtful and littleknown plants. I have neverthelefs but little doubt that it will be made appear, that thefe fecies, Lycoperdon ftellatum and fornicatum, as characterifed by Hudfon, are as clearly diftinet as any
vidilaort \# It was printed at Norwich, but has not the date of the year.
two fpecies can be; and that Mr. Bryant has totally confounded what he meant to elucidate. This has happened from his forming a theory for himfelf, and then torturing the account of the different fpecimens he has met with, to make them accord with this theory.
5. It has been obferved before, that Linnæus mentions but one plant of this kind, to which he has given the appofite trivial name of ftellatum; and has characterifed it in the following words:

Lycoperdon ftellatum-Volva multifida patente, capitulo glabro: ore acuminato dentato. Sp. pl. 1653.-Fl. Suec. No. 1277.
To this Hudfon in his Fl. Ang. added another, under the name of fornicatum, which he has thus characterifed.

Lycoperdon fornicatum - Volva quadrifida fornicata, capitulo glabro: ore obtufo ciliato. Fl. Ang. ed. Ima, 502. ed. 2 da, 644.
This perfectly diftingnifhes it from the fellatum of Linnæus, without the neceffity of making any alteration in the fpecific character of that plant; a circumftance which very frequently becomes neceffary when any new fpecies is introduced into a genus. It is to be obferved, that no notice is taken of the pedunculated head; this being at that time unneceffary, as Dillenius's figure of fellatum, R. Syn. ed. $3^{\text {tia, }}$, and the figures of fornicatum referred to in Fl. Ang. reprefent the plants with peduncles.
6. Mr. Bryant, diffatisfied with this arrangement, from having met with a ftellated Lycoperdon having a feffile head, was immediately impreffed with an idea, that this circumftance was the only proper one to form a fpecific diftinction (p. 10). He therefore directly concluded, that all fpecimens which had the head fupported on a peduncle, muft form one fpecies; and all thofe in which the head was feffile, another. And as it was abfolutely impoffible,
that more than two fpecies of ftellated Lycoperdons could exift, he directly arranged all which he met with under one or the other of thefe fpecies. The fornicatum of Hudfon happening, unfortunately for this theory, to have the head fupported on a peduncle, as well as the plant figured in R. Syn.; this difficulty could no otherwife be difpofed of, than by making that plant, notwithftanding its totally different appearance and habit, a variety of his newformed fpecies of fornicatum. But as the fpecific characters of Linnæus and Hudfon, though he thought proper to retain the names, would not by any means fuit this difpofition, he was under the neceffity of forming new ones, which he has done as follows:

Lycoperdon ftellatum-Radice fubcampanulata*, volva multifida patente; tunica exterioritenui fragill, capitulo albido feflili : ore lacerato. Bryant's Hift. Acc. \&c. p. 14.
To this are quoted as fynonyms, Scop. f. carn. I. p. 63. n. 2. (a) -Hall. Hift. n. $2174 .-$ Buxb. cent. 2. 45. t. 49. f. 3 .

Lycoperdon fornicatum-Radice fibrofa*, volva multifida fornicata, tunica exteriori filamentofa, capitulo nigricante pedunculato. Br. Hift. Acc. \&c. p. 14.
quadrifidum-B.-volva quadrifida.
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* Mr. B. has introduced the roots to form part of his fpecific characters, and he may be right in his defcription of the campanulated root of bis ftellatum, though I have never feen any other roots than fuch as were fufform, terminated by a few fibres; and a root broken in the ground would neceffarily put on fomewhat of the appearance which he defcribes. Perfons converfant with fea plants know that fuch roots are common amongt the fuci; but they alfo know that the moft received opinion is, that the roots of thefe plants are no more than fulcra, or points of fupport; and that the plants do not derive any nourifhment by their means. We can have no doubt but the roots of thefe Lycoperdons are defigned to afford nourifhment to the plant, whilft in a growing ftate; though fonm the peculiar mode of vegetation, they are loft as foon as the plants arrive at ma-

AThe fynonym's are, Scop. flo chan! I. p. 64 (b) qiecedit-Gled. Fand.
 nor Hudfon is quoted, though undoubtedly their fpecies were fappofed to belong to one or the other, and Hudfon's fornicatom is acknowledged to be his (B.)rquadfifidum. - 7 . Let any botanift compare the concife, defcriptive, and difcriminating charactefs, by Linnæus and Hudfon before mentioned, with thefe prolix, vague, and indecifive characters* of Mr. Bryant; and determine whether it be poffible to miftake the plants pointed out by the former, or to diltinguifi thofe theant by the latter. But Mr. Bryant fays, the rays of the fellatum pplit into an indeterminate number of fegments, and therefore it is an improper fpecific diftinction: and this would certainly have great weight, if all the other dpecies did the fame; but it is exprefsly contrafted with the fornicatum, where the rays are defcribed quadrifid, and therefore is highly proper. Again, he fays, the diftinctions 'ore acuminato
turity, when they no longer want their affiftance. It is difficult to conceive how any nourifbment can be derived by a root of the kind Mr. B. fuppofes; and I do not know that any analogy from any other part of the vegetable kingdom can fupport this idea. At any rate, the philofophy of botany inftructs us not to form feecific characters from roots, unlefs others are not to be found; but fuch is not the cafe here; and from the peculiar circumftances, the roots of thefe plants are particularly inadmiffible.

* Exclufive of the impropriety of the roots being made ufe of for fpecific characters, the outer coats are not eafily to be examined when the plants are expanded.. The diftinctions, ' capitulo albido,' and 'capitulo nigricante,' are not founded in fact; as the heads both of Ray's plant and Hudfon's fornicatum, the fornicatum and B. quadrifidum of Bryant, are whitifh when frefhly opened; and the head of B. only turns blackifh in a fhort time; the head of Ray's plant or Bryant's fornicatum remains whitifh or grey. He has formed his fpecific character therefore not from his fecies, but his variety. When we come to explain what Mr. Bryant's ftellatum really is, the reafon for his adopting thefe difinctions will be feen.

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dentato,' and ' ore obtufa ciliato,' are futile (p.13) ; becaufe the appearances of the mouth, and its teeth or ciliæ, vary according to the age and ftages of decay of the plant. This would alfo have weight, were it confiftent with fact; but the real truth is, that the ciliæ furrounding the mouth of ftellatum Linn, whether opening to difcharge the duft or not, have alivays a degree of convergency, and confequently fomewhat of an acuminated appearance; though this is much more evident in fome varieties than in others, as in fome thefe ciliæ form a fharp cone ${ }^{*}$, and in others, one fo blunt as to be nearly flat. The fornicatum of Hudfom on the contrary, when full grown, has always the mouth open, and the ciliæl furrounding it forming a fhort cylinder; and when advanced in age, thefe cilix are fometimes even reflected.
8. From thefe confiderations, it is afferted by Mr. Bryant, that Lyc. fornicatum of Hudion is nothing more than an accidental and flight variety of the plant figured in R. Syn.; and that the lower volva, or bag as it is called, is never feen but when the plant is in a ftate of decay, p. 36. This he attributes to the feparation of the thin outer coat from decay, and from grafs, mofs, or mould, infinuating itfelf fo as to caufe it to fall from the other, and form the bag, p. 27. And again, p. 28. 'by the fun and drying winds Ifetting ' in, and cauling the two אkinis to flake from each otber,' and mould confequently getting between them. In the fame vague and confufed

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manner is the arched appearance of the rays accounted for; 'by ' the flefly coat which is very thick upon the foulders, as foon as it begins ' to Jbrink, prefling fo forcibly upon the rays as to caufe them to contract in ' an arched direction.' P. 27. But fo far is this from being the fact, that this thick coat, in all the other fpecies as well as in this, is deftitute of any fuch force at all; and if the plant be left undifturbed, as foon as it begins to fhrink, cracks, and peels off, or, if it remain on, dries to a mere thin cruft; which proves its nature to be too moift and fucculent to poffefs any elafticity whatfoever. It will befides be fhewn hereafter, that, if the rays of this plant contract at all, it is in breadth, and that at the fame time they increafe in length; and it would be very difficult to conceive how this elaftic force (if any fuch there were) or preffure fhould act fo as to produce this double effect. If the frefhly-opened plant of the ftellatum Linn. and Hudf. be taken from its native place, and carried into a dry room, the thick coat will dry upon the rays without peeling off; and in this cafe it does indeed fomewhat contract them, but this merely from its fhrinking. When this happens, it is fo far from acting to occafion an arched appearance, that it only increafes any tendency the rays may have had, from fituation, to contract irregularly; inftead of being incurved, as thofe of ftellatum always become in age, and after lofing this thick coat, if free and unconftrained. This fpongy coat in the recently-opened plant entirely hides the peduncle, and the head appears perfectly feffile; and this appearance fometimes continues when the plant is immediately removed from its place of growth, and fuffered to dry very flowly. This may perhaps account for fo many authors having defcribed the fellatum with a feffile head; and the figures of Schæffer, $t$. 182, feem to anfwer to this, they being evidently taken from plants juft opened. That fuch is the fact is very likely, as very few of the defcriptions or figures of thefe authors accord perfectly with the

Lycoperdon hereafter to be defcribed, which has really a feffile head.
9. That Mr. Bryant's method of accounting for the double volva, and arched appearance of the rays of fornicatum of Hudfon (to fay nothing of the improbability, or nearly impoffibility, of a fixed and permanent effect, proceeding from vague and accidental caufes), is merely conjecture, and not founded on actual oblervation or folid argument, every botanift who has been in the habit of obferving plants of the order of Fungi muft readily allow ; and if they recur to the pamphlet itfelf, they will fee that the obfervations and arguments are not miftated. If therefore it fhall be made to appear, that, fo far from being caufed by age or decay, the appearance of this plant, as to the principal facts, is the fame throughout all its ftages; and that it is fubject to as little variation as almoft any other plant, and to much lefs than by far the greater number of this order of vegetables-if it fhall be demonftrated, that the peculiar appearances cannot originate from the caufes affigned, no doubt will remain as to the propriety of Hudfon's arrangement; and his fpecies of Lyc. fornicatum will be fully re-eftablifhed in the rank from which it has been endeavoured to be degraded.
10. Mr. Bryant afks, p. 39. 'If the quadrifidum be a diftinct Spe' cies, how comes it to pafs that it is fo very* fcarce; when the head of ' a fingle plant (if the duft be allowed to be the feed) is fufficient to pro${ }^{6}$ duce thoufands; and yet a perfon who fearches on purpofe, where thefe

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'plants bave been reputed to grow, may not meet with one in a whole feafon?? -He has not then met with it very frequently near Norwich; but though certainly a rare fpecies, it happens to be by no means. very fcarce in this neighbourhood; there being feveral fpots in which it is every year to be found, and fome of thefe four or five miles afunder. For fome years paft that I have attended to thefe plants, I have never failed meeting with this in fuch of thefe places as have been vifited; and in this refpect it is much more certainly to be found than the ftellatum Linn. which, though much more common, is rarely met with two years on exactly the fame fpot; and for this a reafon will be prefently given. In one place not lefs than ten of the fornicatum Hudfon or quadrifidum Br . have been found within a few yards of each other; and of all, which in the courfe of feveral years I have obferved in different places, not one varied in the arched form or number of its rays\%. But if there were a plant accidentally difcovered with five or three rays, it would no more difprove the character of the fpecies, than finding the Paris quadrifolia with five or three leaves, which is not very uncommon, would difprove the identity of that plant. A fpecimen, it is true, has been fhewn to me with three rays; but on examination, it was found that one ray, both of the upper and lower volva, was as broad as the remaining two; and they had begun to fplit at the points, which were feparated for a fmall fpace in each. This plant was therefore accidentally prevented from taking its proper form, and yet the arched appearance was preferved, though not

[^3]perfectly regular, and the upper rays ftood upon the tips of the lower. In this cafe therefore, evidently, exceptio probat regulum.
II. The Lycoperdon ftellatum Linn. and Hudf. with its fuppofed varieties, and the L. coliforme of Dickfon fafc. I. remain a confiderable time in their egg * fate; during which the top is nearly level with, or but little elevated above, the furface of the ground; and they have a root by which they are fixed, and by means of which they derive the nourifhment neceffary to their growth. When fully ripe, the volva burfts at the fummit into an indeterminate number of rays; the plant is turned infide out, what was before the upper and outer furface becoming the under and inner; it is raifed entirely out of the ground, and refts on the expanded rays of the volva; the root, no longer of any ufe, being by this expanfion broken off, and left in the ground. Thus far my obfervations agree with thofe of Mr . Bryant; but it is by no means a fact, as that author afferts (p. 17), that they bave iben a tendency to raife themfelves on the tips of their rays; or any prebenfile quality, by which they endeavour to lay bold of the grafs, mofs, or whatever is in their wayt. The plant being by the procefs juft defcribed abfolutely liberated from the ground, unlefs accidentally detained, it depends entirely on the fate of the atmofphere whether it remains flat or is contracted. If the air be moift, it will probably remain for fome time

[^4]flat; but if that be dry, the rays will be fpeedily divefted of their fpongy coat, which will foon crack and peel off, and then they will foon contract; and, if nothing impede their natural tendency, will be incurved, and confequently raifed fomewhat upon their tips. It is evident that if grafs, mofs, or even loofe mould, fhould be under the plant at this time, fome may be caught up and retained by them. In dry weather the thick fpongy coat foon cracks, and puts on that teffelated appearance which is reprefented by Mich. t. 100. f. 6. and in Mr. Bryant's plate f. 4 . in which ftate it has been confidered by fome authors as a diftinct fpecies: but this appearance is of fhort duration, being only the prelude to that coat's peeling off; after which the plant becoming very light, is frequently removed by the wind far from its native place; which accounts for this fpecies being rarely found two years together on the fame fpot.
12. Such is the mode of vegetation common to Lycoperdon ftellatum and coliforme; but the fornicatum of Hudfon is of a very different nature. This plant arifes from a round or egg-fhaped volva, which is of a thicker fubftance than that of ftellatum, and like that is fixed in the ground; but which it does not, like that, quit upon opening. The fornicatum when ripe fplits at the fummit into four equal, or nearly equal parts; the head, with a correfponding number of rays, is by the opening of the volva raifed from within its cavity; and the rays in a fhort time acquiring firmnefs*, are fixed in their arched fituation, each refting on its correfponding

[^5]fegment in the lower volva. In this procefs there is no actual turning infide out, as happens to the other fpecies; and the lower volva being undifturbed, the plant remains attached to its fituation, unlefs fome much greater degree of force be applied to it than is fufficient to remove the ftellatum. They are therefore but rarely found loofe, or blown about by the wind; and from this, their being found for years together on the fame, or nearly the fame, fituation is to be accounted for. Their heads are alfo of a much firmer texture, and do not difcharge the duft or feed with fo much freedom as the ftellatum; and to thefe circumftances their greater degree of fcarcity may reafonably be attributed. The root of this plant is rarely found adhering; for though the volva does not reverfe itfelf, as in the ftellatum, it is evident that the fplitting and opening of the rays may break off the root; or if not, the plant foon after opening, arrives at its full growth and perfection, and the root confequently decays, and is left in the ground when the plant is taken up. That fuch is the mode of vegetation, I can affert, from having found a plant very recently opened, in which the head had arifen from the lower volva, and the rays were acquiring their arched fituation on the tips of the lower rays. This plant was perfectly white, and much refembled the figures in Schæffer, t .183 . f. 1,2 ; but on vifiting the fpot again two or three days after, it had acquired the perfect fhape of the fornicatum, as reprefented in Blackftone's figure; the fpongy coat had dried, and was beginning to fcale; and the whole plant had acquired a deep fufcous colour. That the figure of this plant did not happen from decay is evident; and that it was not forced into fuch a fhape by the accidental falling in of mould, \&cc. between the coats of the volva, is certain, becaufe it grew on a flat furface under the fhelter of a bufh; and neither grafs, mofs, nor any other fubftance was found in the cavity
of the volva, or inferted between the arched rays fupporting the head.

I3. That the volva of this plant lies deep in the ground is very true; that is to fay, the top of the unopened volva is ufually even with the furface, or perhaps funk juft beneath it; and this very circumftance, which Mr. Bryant adduces as a proof of its being a variety, is, from its concomitant circumftances, a moft convincing one of its being a real fpecies. The opened volva, if the plant has been undifturbed, and is not actually loofened and rolling about, which is feldom the cafe, is always buried nearly or quite to its tips in the ground. From attending to this, it will appear evidently impoffible that it fhould open in the fame manner as the ftellatum; which by its fplitting at the top, and the rays abfolutely reverfing their fituation, is raifed entirely out of the ground. But Mr. Bryant fays (p. $3^{8}$ ) that, after having raifed themfelves out of the ground, and actually ftanding on the tips of the rays, the lower fkin feparates, and forms the bag; ' owing to the fun and dry winds getting - in and caufing the two kins to flake from each otber; the confequence of ' which is, as the upper cuticle contracts, it muft recede from the under, ' and fland upon its tips.' It is evident, from this mode of accounting for it, that, as the lower volva is always buried in the ground, the under coat muft recede from the upper, and, by fome unknown power, again plunge itfelf into the earth, which it had fome time before fprung out of; for as it is ufually empty, and clear of any mould or other matter, it is impoffible that any run of a bank fhould occafion this immerfion: befides, it is often found, as has been before obferved, on a flat furface, or on banks covered with grafs or mofs, in either of which fituations it is utterly impoffible that any run of the mould could take place.
14. Again : it is evident, that if two plants of the fellatum ftand
nearer each other than the amount of the femi-diameters of the circles formed by the expanfion of their refpective rays, and thefe plants open nearly together, the rays of the laft which expands mult lie imbricated over the rays of the firft. Or, if they fhould open at the fame inftant, the rays muft be prevented from their full expanfion, and remain fupported by each other; in which cafe the heads muft be below, or on a level with the tips of the rays on that fide, whilft on the other the plants would be fully expanded \%. The fame appearance muft happen to a fingle plant, if in confequence of meeting with any obftruction it is permitted only to open partially; of which inftances are given by Mr. Bryant (p. 30-32), and reprefented in his plate, fig. 16, 17. A ftill ftronger inftance is given in the fame place, of a plant, which from growing in a hole was prevented from expanding at all, and remained confequently with the rays furrounding the head. Fig. 2. of his plate, though not given with that defign, well reprefents this; and, with the others juft quoted, will fully explain and exemplify what is here afferted.

I5. It feems not very uncommon for the Lycoperdon fornicatum to grow in pairs, forming a kind of twin plantt. I have feveral times met with fuch, and in one particular fpot have for three fucceffive years found fpecimens anfwering that defcription. One of thefe, which was gathered in the laft autumn (I790), I have now the honour of laying before the Society. Thefe plants grew on the flope of the north fide of a fteep bank, abfolutely free from any bufhes or briers, and covered entirely with grafs and mofs, which prevented the foil from running. The inequality of the ground

[^6]on which thefe ftood, Mould, according to Mr. Bryant (p. 39), have occafioned an irregularity in the plants. The lower volvæ, though not abfolutely coalefced, are fo united, that they cannot be feparated without fome force and damage ; it is evident therefore that they grew clofe together before opening; and from the foil which ftill adheres, it is farther evident, that they were fixed in the ground to the tips of the lower volve. Therefore, had thefe plants opened in the manner in which the ftellatum is known and acknowledged to expand, they would have been in the fituation which is defcribed in the foregoing fection; and the heads muft have been mutually covered or fhaded on the fides where they touch, by the unexpanded rays, as reprefented in the figures 16. and 17. there referred to: or rather, as the earth in which they were funk muft have prevented their expanfion on the fides oppofite to thofe on which they touch, they would have been reprefented by fig. 2, fuppofing another exactly fimilar figure joined to it. But as the arch of each is fully and regularly formed, and the volvæ regularly divided; and as from the fituation on which they grew, none of the accidental caufes fuppofed by Mr. B. could operate upon thefe plants; it is evident that the heads, and quadrifid arched rays, on which they are fupported, muft have arifen from the volvx, and fixed themfelves in their prefent form. A careful infpection of the fpecimens, and comparifon of them with the figures, and with what is here afferted, will, I truft, convince any unprejudiced obferver, that fuch muft be the mode of growth of this very extraordinary plant.
16. The lower volva (or cafe as it really is) is of a thick and rigid fubftance, extremely different from the thin outer coat of the ftellatum of Linn. and Hudf. as a bare infpection will evince; and the bottom of this, in the fully-expanded and perfect plant, is gene-

rally flattened; the rays are ufually fplit fo far, and are broad and fhort; whilft thofe which fupport the head are much longer and narrower, equally fplit to within about half an inch of the head, and always convex outwardly, and concave inwardly, which occafions them to form rounded angles. The interior furfaces of both upper and lower volva are fmooth, and fhew no traces of having been forced afunder: on the contrary, a bare infpection muft convince any one, that though they undoubtedly muft have been in contact, they fhew no appearance of having been united, except at the tips, where they fo ftrongly adhere, that fome confiderable force would be neceffary to feparate them *. At this time the actual meafurements, of what Mr . Bryant fuppofes correfponding parts, by no means accord; and it would be beyond the art of man, by moiftening or any other procefs, to bring the upper and lower rays to be commenfurate with each other. From what caufe it is, that this growth or extenfion, and this arched form of the upper rays take place, we know not; but the fact is the fame in all fituations. It has been fufficiently proved, that this cannot be occa fioned by the caufes to which Mr. Bryant attributes it; and fo far from having the appearance of being accidental, the whole looks much more like a work of art than of nature, and is ufually taken for fuch by perfons unaccuftomed to botanical fubjects. This furprifingly fingular conformation has been looked upon to be the refult of accident and blind chance!

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17. A fufpicion has been before hinted, that Mr. Bryant has been led into thefe miftakes by finding a ftellated Lycoperdon with a feffile head, which he with reafon thought muft be a different fpecies from thofe which had pedunculated heads; notwithftanding Linnæus has quoted as fynonyms to his ftellatum, authors who have defcribed plants both feffile and pedunculated, without even allowing this peculiar circumftance to form a variety. This appeared the more likely, as it can hardly be fuppofed, that fo patient and accurate an obferver could have defcribed as having feffile heads, plants which are never found without the peduncle; deceived by the thicknefs of the interior (apparently exterior) fpongy coat of the rays, which it has been before obferved completely hides the footftalk of the ftellatum of Linn. and Hudfon, when frefhly opened, and even for fome days, if the plant be foon after expanding removed into the houfe*. It is therefore not unreafonable to conclude, that the plant called Lyc. ftellatum by Mr. Bryant is actually the fpecies mentioned f. 8 , and which will prefently be more fully defcribed; as this is the only ftellated Lycoperdon with a feffile head which has been met with by other botanifts in this country, and as the defcription and figures of Mr. Bryant's ftellatum perfectly accord with this plant. That this is a perfectly diftinct fpecies from the plant of Ray's fyn. and confequently from the L. ftellatum of Linn. and Hudf. will not admit of a doubt; and the fmall variety, which is excellently figured in Mr. Bryant's plate f. Io. is the plant, the rays of which are fo peculiarly fenfible to the effects of moifture or drynefs in the atmofphere. This circumftance has occafioned that author to give thofe

[^8]fanciful defcriptions of the animal nature of thefe plants (p. 4 T et feg.); an idea which is of itfelf fufficient to convince the cool naturalift of the readinefs with which this otherwife ingenious botanift is apt to catch at any thing which interefts his imagination. To the variations of the atmofphere are alfo to be attributed the contraction and dilatation of the teeth or ciliæ furrounding the mouth in the different fpecies, which remain as long as any duft is contained in the head; though this circumftance Mr. Bryant alfo attributes to the animal nature of the plant, and fuppofes to be voluntary as long as the plant has life. But unfortunately for his arguments, which prove rather too much, the prehenfile property of the claws (for fo are the rays called) is fuppofed to continue even after death; as one of thefe plants has held an unfortunate fornicatum of Hudf. 'in its mercilefs gripe' for feveral years in a drawer of the author's cabinet (p. 45). There can be no neceflity for entering into any arguments to prove, that thefe appearances are entirely owing to the coriaceous nature of thefe plants, and that they are acted upon by a moift or dry air, exactly in the fame manner as any other fubftances of the fame kind. It was neverthelefs neceffary to take notice of it, as the author builds part of his fyftem upon it, not only having an idea, that in the plants juft mentioned it is fpontaneous; but alfo (p. 17, 18) attributing a furprifing degree of natural elafticity to the rays of his ftellatum, from the circumftance of one of them difengaging itfelf with great force from a couple of pens, with which he had endeavoured to expand the incurved rays, to take a drawing of it *. It evidently appears that this proceeded entirely from the fame caufe, and not from any fpontaneous elafticity naturally inherent in the plant, which had

[^9]been removed from its natural fituation on (probably) a moift bank, and directly brought into a dry room and placed upon a table.
18. This effay has been drawn out to a much greater length than was at firft thought of, and for this fome apology may be neceffary: but it muft be confidered, that a principal object of it is to eftablifh the Lycoperdon fornicatum of Hudfon as a fpecies; and that it was impoffible to do this effectually, without anfwering the objections made by the author of 'the Hiftorical Account of two Lycoperdons.' It muft be farther underftood, that thefe objections are fcattered through 52 octavo pages, and that the correfponding obfervations and arguments are frequently to be fought for at many pages diftance; and it may then ceafe to be furprifing that it could not be comprifed in a fhorter compafs, and that fome flight repetitions may have unavoidably crept in. But though already much too long, indulgence muft be requefted for a word or two more upon Mr. Bryant's plate, which is abfolutely neceffary before it is concluded. The figures in this plate from I to 10 inclufive, are all referred to L. ftellatum, and from II to 20 to fornicatum; but it is to be obferved, that the fornicatum of Bryant* is the ftellatum of Ray's fyn. 27. t. I. f. I. and that all thefe figures, except 15 and 20, are profeffedly different appearances of Ray's plant. How much all thefe differ from the figures in Phil. Tranf. and Blackf. Sp . bot. and alfo from Sch .183 . will be eafily feen by comparing them together. All Mr. Bryant's figures, except 15 and 20, fplit into an uncertain number of rays; and thefe vary in their feparations, as to the diftance from the head, and form extremely acute angles with each other. The figures 15 and 20 are declared to be intended as reprefentations of the fornicatum quadrifidum, or fornicatum of Hudfon; and though I would not willingly acufe Mr. Bryant of having mifreprefented the fpecimens to fupport his own

[^10]fyftem, I am under the neceffity of faying, that they do by no means reprefent the plant fairly. Let a comparion of thefe figures with fpecimens be made; and at the fame time a comparifon of the figures and fpecimens with the figures in Phil. Tranf, and Blackft. Sp. bot. and the truth of my affertion will evidently appear. Mr. Bryant's fig. 15, which is intended to reprefent a perfect quadrifidum, exhibits the lower rays, or divifions of the volva, equal in length and breadth to the upper, and fplit abfolutely to the centre. The upper rays are figured flat, forming acute angles at their junction, and touching the lower only at fome fmall diftance from their tips; they are alfo curved in a direction never feen in this plant, except recently opened, as figured in Sch. 183. I. but this is profeffedly an old fpecimen in a ftate of decay, and rolling about, the fport of wind and weather (p. 28). From thefe circumftances, I fhould have been led to fuppofe that Mr. Bryant had actually never feen and examined the real Lycoperdon fornicatum, had I not been fhewn a fpecimen received from him, which correfponded exactly with mine, and the figures I have quoted. The only conclufion I can therefore draw (for I am very far from accufing, or even thinking Mr. Bryant capable of wilful mifreprefentation) is, that he may have met with a fpecimen or fpecimens of Ray's plant, in which fome of the accidents defcribed may have taken place, and caufed fome variation in the appearance of the plant, and fome refemblance of the double volva. The fpecimen from which fig. I4 was taken, which feems to have been partially buried in the ground, may have been of this fort; and with the help of a warm imagination, of which ftrong inftances have been given, and a violent paffion for forming a theory, would afford fufficient ground for this author to work upon. This is the more probable, as he has defcribed the Lyc. fornicatum, B. quadrifidum, or fornicatum of Hudfon's Fl. Ang. to be a plant of extraordinary rarity. But
fuch a circumftance, if it really did happen, would prove nothing againft the arguments brought in favour of the fpecific character of that plant.

## ENUMERATION.

IT now remains to enumerate the different fpecies of ftellated Lycoperdons which have been found in this neighbourhood; and thefe are prefumed to be four. Of thefe, the ftellatum of Linn. and Hudf. and the fornicatum of Hudfon have been fo amply treated of in the foregoing pages, that little more remains neceffary, than to apply to them fuch fynonyms as really appear to belong to the refpective fpecies. This will be an eafy tafk in refpect of the fornicatum, which has been mentioned but by very few authors; but great difficulty arifes in adjufting fuch as belong to ftellatum. Many authors have defcribed a plant of this fort with a feffile head; and their defcriptions are in general fo vague, and their fynonyms fo confufed, that it is impoffible to afcertain with certainty, whether they mean the ftellatum of Linnæus and Hudfon; the Lycoperdon which I fhall call after Schmiedel by the trivial name of recolligens; or fome other plant which may be different from both. For thefe reafons I fhall be very fparing of applying fynonyms to both thefe fpecies. The Lycoperdon coliforme of Dickfon's ift fafc. makes up the number feecified.

Lycoperdon ftellatum-Volvâ multifidâ patente; laciniis inequalibus, capitulo pedunculato glabro; ore acuminato dentato. Linn. Sp. plo 1653. Hud. Fl. Ang. 643.

Diag.

Diagn. The volva is irregularly fplit into an uncertain number of rays; the head nearly globular, and fupported on a peduncle; the mouth furrounded with cilix, converging into a cone; and the whole plant of a dirty white generally, but the head fometimes tinged flightly with grey.

As Linnæus has quoted Ray, there can be no doubt but his ftellatum is the fame as Hudfon's; but fome of the fyn. quoted in Sp . pl. and his other works are doubtful, the head in them being defcribed feffile.

Fungus pulverulentus crepitus lupi dictus, coronatus et inferne ftellatus. R. Syn. 27. t. I. f. I.-This is the beft reprefentation of this plant I have hitherto feen.

Lycoperdon fornicatum. Bryant's Hijt. Acc. of two Lycoperdons, f. 12. 13. 14. 16. 17. are undoubtedly to be referred here from his own authority.

Lycoperdon fornicatum. Relban Fl. Cantab. 981. rejecting the fyn. of Hudfon, Schæffer, and Batarra.

Scbmiedel Ic. pl. 46. certainly belongs to ftellatum. Pl. 43. exactly refembles Schaff. fig.t. 182, and is therefore doubtful.

Pollich. palat. 1197. exactly copies Linnæus. The above are all the authors, which have fallen under my obfervation, that I can fafely quote to this fpecies.

Schaffer $t$. 182. Thefe figures extremely refemble our plant recently opened, and before the peduncle becomes vifible, but the head is defcribed as feffile; and yet the author refers to Raii fyn. and the fig. of Dillenius, which makes it probable that he had not well confidered, and had not very clear ideas of thefe plants. It may poffibly be fome fpecies which has not yet fallen under my obfervation.

Hall. Helv. 2174. Lyc. cortice exteriori revoluto ftellato. No notice is taken by this author, whether the head be pedunculated
or feffile; and the fyn. are fo contradictory, that nothing can be made out from them. He quotes Eph, nat. cur. ann. 4. obf. 90. which is Lyc. fornicatum Hudf. for this fpecies. Mich. t. 100. f. 6. with the teffelated rays is alfo mentioned as a variety, and alfo the plant with the rays again divided, $f \cdot 5$.

Scop. carn. 1633 and 1634 , enumerates two fpecies, of which the firf from the fpecific character fhould be recolligens; but the diagn. contradicts this, and his fyn. will not help the difficulty. He quotes Hamb. Mag. tom. 5. p. 4II. f. I. for this fpecies, and p. $4.03^{\circ}$ $f .5$. for coronatum; but thefe figures, which are very bad, reprefent the fame plant. The references for coronatum are quite contradietory; as it is impoffible that Sch. 182. 1. Bat. 39. I. and Mich. 100. 3. can all reprefent the fame plant, and Sch. 182. 1. and 182. 2. differ but in fize from each other. The coronatum is defcribed as growing on decayed trees, for fo I muft underftand ' in truncis' to mean, and none of our ftellated Lycoperdons are ever found in this fituation.

Mich. nov. gen. 220. t. 100. f. 1 -6. Geafter. This author has defcribed and figured fix fpecies. One of thefe, No. 3. f. 2. is defcribed as having a fhort peduncle; but neither defcriptions nor figures point out whether the heads of the reft are feffile or pedunculated. No. I. f. I. is doubtfully referred to R. fyn. but from the number and regularity of the rays, the form of the head and mouth, and the apparent tendency of the rays, as reprefented in the plate, to turn upwards, it more refembles recolligens. No. 4 . f. 4. exactly refembles f . i. except that it has fix rays only; and the mouth is quite naked; a circumftance which prevents its being fafely referred to any Britifh fpecies. No. 3. f. 2. fomewhat refembles the fmall variety of ftellatum; but the head is fcarcely flat enough, and the peduncle is not fimilar. No. 2. f. 3 . feems to be really recolligens. No. 5.f. 5 . refembles ftellatum with the rays
fplit, but the mouth of this is alfo naked; as is $f$. 6 . which from the number of rays and fhape of the head might be otherwife recolligens. None of thefe can therefore be fafely quoted for ftellatum.

Bocc. Muf. t. 305.f. 4 is very doubtful.
Buxb. Cent. 2. t. 49.f. 3. is fo bad a figure that it cannot be quoted with any certainty; it approaches neareft to ftellatum of Sch. t. 182.

Dalib. Paris. 390. is impoffible to afcertain, as he has neither defcription nor figure.

Royen. Lugd. Bat. 5 r9. quotes R. Syn. t. I. f. I. and Mich. t. 100. $f .1,2,3$. It is therefore uncertain whether his plant be ftellatum Linn. and Hudf. or not.

Tourn. Inft. R. H. $5^{6} 3$. t. 33 1. is referred to Bocc. Muf. The figure is fo bad, that it cannot be at all determined.

Vaill. Paris. 123. Lyc. veficarium ftellatum is referred to Tournefort without any defcription.

Fl. Dan. 360 . may be fome new fecies; it certainly does not at all refemble our ftellatum.

Glediffch. p. 15T. has feveral varieties: but his fpecies is probably to be referred to ftellatum; though, as he gives no figures, it is doubtful.
$\mathrm{Ob} \int$. When frefh opened the head is ufually more orlefs depreffed, and often fomewhat oval; but when the thick coat is either peeled off, or dried upon the rays, the head ufually becomes globular, and refembles the figure in R. fyn. and the plant then appears fo different, that a perfon unaccuftomed to obferve them would fcarcely believe it could be the fame. The peduncle is generally thickened at the top and the bottom, and fmalleft in the middle, or, as it may be called, doubly club-fhaped; but fometimes it is cylindricat. From thefe different appearances, this plant has been differently

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defcribed
defcribed by various authors; but probably the fame, or fome flight variety, has been intended by the greater part of them.

Angl. Star puff-ball-In various places near Bungay in the fpring and autumn, and the winter if it be mild.
$\beta$ minor-The only permanent variety I have met with here, and which certainly is not diftinct, may be characterifed-capitulo fuperne plano, ore acuminato, ciliis longioribus. See Bryant's Hifo. Acc. $f$. 19. the head only, but admirably well expreffed.

This elegant little variety grows on dry banks, ufually amongft ivy, and feldom exceeds an inch or an inch and half in the diameter of its expanded rays. The colour is dark brown ; the head flat on the top; and the mouth furrounded with long cilix, forming a very fharp cone; the peduncle is longer in proportion to the fize of the plant than in $\alpha$.

Mich.t. 100.f. 2. may poffibly be this plant. It is found in Ditchingham, Earfham, and other places near Bungay.
Lycoperdon recolligens - Volva multifida patente, laciniis aqualibus; capitulo depreffo-fphærico, Seffili; ore acuminato.
Diagn. Rays of the volva equal, 5 to 7 , rarely more; when dry, reflected over the head; head feffile.

Lycoperdon volvans recolligens. Scbmiedel Icones plant. 27, 28. $f .20$ to 3 r. rejecting the fyn. which are doubtful. The defcription is extremely good, but the plant is figured and defcribed with rays from 5 to 20 , equal or unequal, entire and fplit, which circumftances do not entirely accord with the Englifh fpecimens; and poffibly the author may have confounded two fpecies together. He fays of the head, ' Capitulum Seu globulus volve medio firmiter innafci'tur, fefilis, abfque pedunculo aliquali:' which perfectly agrees with our plant.

Lycoperdon ftellatum.-Bulliard, Plantes de la France, t. $23^{8 .}$

Lycoperdon ftellatum-Bryant's Hij. Acc. of two Lycoperdons$f .3,4,5,6$. Io. The fpecific character of Mr. Bryant's Lyc. ftell. 'capitulo albido feffili' fo entirely agrees with this fpecies, and his fig. 10. is fo excellent a reprefentation of the fmall fpecimens, and the others here quoted very good ones of the large ones, with which the account, p. 43, 44, alfo well accords, that I can have no doubt in referring his plant here.

- Lycoperdon ftellatum-Relban FL. Cantab. 980. admitting only the fyn. of Bryant and Micheli.
Mich, t. 100. f. 3. and perhaps 1. 4. 6.
Ob . The volva is ufually divided into 5,6 , or 7 rays, which are equal, or nearly fo, of a chefnut colour on the upper fide when expanded, and filvery white beneath. The head fpherical, confiderably depreffed, perfectly feffile, of a yellowih white or pale ftrawcolour; the mouth ciliated, and ufually furrounded with a circle of a paler colour; and a fimilar circle is often obferved on the upper part of the rays furrounding the head. The rays when moift are regularly inflected, as reprefented in the figures of Bryant and Bulliard; but when dry are reflected, and entirely cover the head. If they are kept in a dry place, they will at any time undergo thefe changes, by placing them in a faucer with a fmall quantity of water, and again drying them; but the changes are quicker, and more certain in the fmall plants, than in the large ones. The diameter of the expanded rays varies from one inch to three or four, and the fize of the head from that of a pea to an inch diameter.

Angl. Hygrometric puff-ball-Ditchingham and Earham, Norfolk; Mettingham, Suffolk, near Bungay. Spring and autumn.

Lycoperdon coliforme - Volva multifida patente, capitulo depreffofphærico, pedunculis ofculifque numerofis. Dickjon, Fafc. plant. crypt. I. 24. t. 3. f.4.-Witb. Bot. arr.ed. I. $783^{*}$.

Fungus pulverulentus coli inftar perforatus. R. Sjn. 27. rejecting the fyn. of Tournefort.

Diagn. The volva multifid, rays irregular, mouths and peduncles numerous.

Ob . The head is in the large feccimens confiderably depreffed; in the fmall ones nearly fpherical; of a whitifh colour, and covered with a thin tunicle of a moft beautiful filvery grey, peculiar to this fpecies, but fimilar to that which forms the outer coat of the recolligens. The mouths are numerous, flightly elevated, and fringed with fine hairs. The peduncles, which do not appear till the thick fpongy coat dries or peels off, are numerous, woody, filiform or ftrap-fhaped; and appear to bear fome kind of proportion to the number of the mouths, though there are no correfponding cells. In the fmall feecimens the mouths and peduncles are few. It has been doubted whether thefe mouths might not be accidental, and formed by infects after the expanfion of the plant. But this (not to mention their regularity, and that each is furrounded by its border of cilix) is clearly difproved, from the marks of the projections formed by the mouths being feen on the expanded rays, when frefhly opened, as reprefented in Dickfon, $t$. 3 . f. 4. ad litt. b. I have likewife found an abortive plant, in which the feed did not ripen; but which had numerous projecting papillæ on the head, where the mouths fhould have been formed.

The volva of this Lycoperdon is funk deep into the ground, the fummit being on a level with, or very little elevated above, the furface. On taking one up, it was found to be nearly globular, but flightly depreffed; of a dirty white, wrinkled and fcaly; with a fhort thick root terminated by a few fmall fibres. When cut open, this confifted of a foft coriaceous coat, within which was another thicker, and of a much tougher fubftance, filled with a white curdlike fubtance, of a very difagreeable fmell. This was fo young
that there was no appearance of the head. They remain a confiderable time in this ftate, appearing to ripen flowly: one which was difcovered about the middle of Auguft, remained unchanged to the end of November, when it was found fully expanded, and refting on the furface of the ground, in which it had been before buried. This had been vifited the preceding day, and not any alteration had been then obferved in it. It appears therefore, that when ripe, the change is very fudden; and that the head, prefling againft the interior part of the volva, and probably affifted by the action of the fun (for the day on which it expanded was remarkably bright and fine), the outer coat fuddenly gives way, is fplit into an indeterminate number of rays; the root is broken off, and left in the ground; and the plant being turned infide out, is neceffarily raifed upon the furface, what was before the outer and upper part of the volva being now next to the ground. This, which has been before ( $\mathrm{f} . \mathrm{II}$.) defcribed as the mode of expanfion of the fellatum, is alfo common to thefe with the recolligens.

Angl. Cullender puf-ball.-Gillingham and Earfham, Norfolk; Bungay, and Mettingham, Suffolk. In the autumn. I have never met with a frefhly opened fpecimen of this fpecies at any other feafon.

Lycoperdon fornicatum-Volva quadrifida fornicata; capitulo pedunculato, glabro; ore obtufo ciliato. Hudf. Fl. Ang. 644.
Diagn. The volva quadrifid, and remaining in the ground when opened. The head globular, pedunculated, and elevated upon four arched rays, refting on the tips of the divifions of the volva; the mouth open, and furrounded with cilix, forming a cylinder; the frefh plant white ; but the whole foon changing to a dark brown.

Geafter volvæ radiis et operculo elevatis. Watfon Pbil. Tranf. vol. 43. p. 234. t. 2. f. II and 12 .

Fungus pulverulentus turriculam fornicatam referens. Blackft. Sp. Bot. p. 24.t. 2. a very good figure, but larger than the plant is ufually found.

Fungi monftrofæ ac infolitæ formæ. Rayger. Eph. nat. cur. dec. r. ann. 4. obf. 90 .

Lycoperdon coronatum Sch. t. 183 . exceedingly good figures of the plant recently opened, and before it changes its colour. The defcription is tolerably accurate; but the fyn. are all to be rejected except Batarra.

Geafteroides. Batarra fung. app. 74.t. 39.f. 1 and 4 excepting the root; $f .3$. feems imaginary. A twin plant is mentioned by this author.

Lycoperdoń fornicatum B. quadrifidum. Bryant's Hift. Acc. f. 15 . L. feneftrati var. $\beta$ and $\nu$ Bat $f$ ch. El. Fungor, 243. t, 29.f. 168. a. b.

Angl. Turret puff-ball.-Eariham, Ditchingham, Brome, and Gillingham, Norfolk; Bungay, Suffolk.-In the autumn.

Postscript. It was at firft intended to add, by way of appendix, fome obfervations upon the Lycoperdon Carpobolus; which, if really a Lycoperdon, more properly belongs to this, than any other divifion of the genus. The prefent paper has, however, extended to fo much greater a length than was originally thought of, that the author muft referve what he had to offer upon the Carpobolus for fome future leifure, if the prefent communication fhould be thought worthy of the notice of the Society.


[^0]:    Vol. II.

[^1]:    [a* It may be worth obferving, that Lightfoot, Fl. Scot. 1068, takes notice that the Lyc. ftell. Linn. had not then been found in Scotland; but that it probably would, as it was found in Sweden, which was farther north. This opinion has been fince verified, as it was found near Edinburgh by our Prefident, ann. 1782.

[^2]:    * How truly philofophical and conclufive is this argument againft the fpecies, drawn from the fcarcity! and yet this, curious as it is, is exceeded by another. We are told, p. 38. that Mr. B. found a quadrifid plant on the top of a bank, on the flope of which feveral of the ftellatum of Linn. or Ray's plant grew; therefore there was no doubt but they muff have originated from the fame feed. If this argument be allowed, one may undertake to prove, that the Onopordum Acanthium, and Carduus marianus, certainly proceeded from the fame feed, becaufe they have frequently been found on the fame bank.

[^3]:    * Some of thefe plants ftood on the flat furface of the fummit of a bank, others on flopes of very different angles; fome amongt bufhes, others on graffy banks entirely expofed; all which different fituations Mr. B. fays muft occafion different appearances, and different expanfions of the rays (pp. 37, 38,39 ); and yet every one of thefe plants when fully grown correfponded with Blackftone's fig. except in fize.

[^4]:    * This term is ufed to exprefs the unopened volva, which fomewhat refembles an egg. A plant of coliforme remained in this ftate apparently unchanged in fize or figure near four months. This fpecimen, the fineft and largeft hitherto difcovered of that curious fpecies, is in the mufeum of Sir J. Banks, P. R.S.
    $\dagger$ Though Mr. B. is fpeaking here of his own ftellatum, which is a different plant from that of Hudfon, it makes no effential difference as to thefe obfervations. Whether his plant remains flat or not, depends equally on the ftate of the atmofphere; but his plant changes its appearances repeatedly with the changes of the air from moift to dry, and Hudfon's when once contracted preferves its form and is never again fully dilated.

[^5]:    * The fpongy coat is not nearly fo thick in this fpecies, on the rays of the plant, as on the fellatum of Hudfon, though thicker than on the fellatum of Bryant; and its peduncle is obfervable when the volva firft burfts. And here it is neceffary again to eaution the reader to remember, that the fornicatum as defcribed by Mr. B. is confidered as a different plant from that of Hudfon, which I am here defcribing; and that if it be proved that the latter is not a variety of the former, as he afferts, his defcription of the one plant has nothing to do with the other, and all his arguments deduced from fuch defcription muft fall to the ground.

[^6]:    * Vide Schæff. t. 182. f. 2. where this is well exemplified.
    + Batarra, app. p. 74. mentions receiving a twin plant of this Lycoperdon from a correfpondent.

[^7]:    * If the fingular appearance of this plant be owing to the accidental feparation of the coats of the volva, from decay, and the other caufes to which it is attributed in the pamphlet, how happens it that they fo regularly feparate to the tips of the rays only? and why do not the fame caufes operate to feparate them entirely? It would extremely puzzle the author of the pamphlet to anfwer this queftion fatisfactorily; and the whole might be refted on this fole argument, were it neceflary.

[^8]:    * I have repeatedly brought home recently opened fpecimens, the heads of which have appeared perfectly feffile, and which have retained that appearance for two or three days; till, by the drying of the fpongy coat, the peduncle has appeared.

[^9]:    * The circumftance here mentioned affords an additional proof, that this fellatum of Bryant is really the plant mentioned in the beginning of this fection, and f. 3.

[^10]:    *Vide antea. Notes to f. 7 and 12.

